

## The Japanese species of the genus *Adoxophyes* Meyrick (Lepidoptera, Tortricidae)

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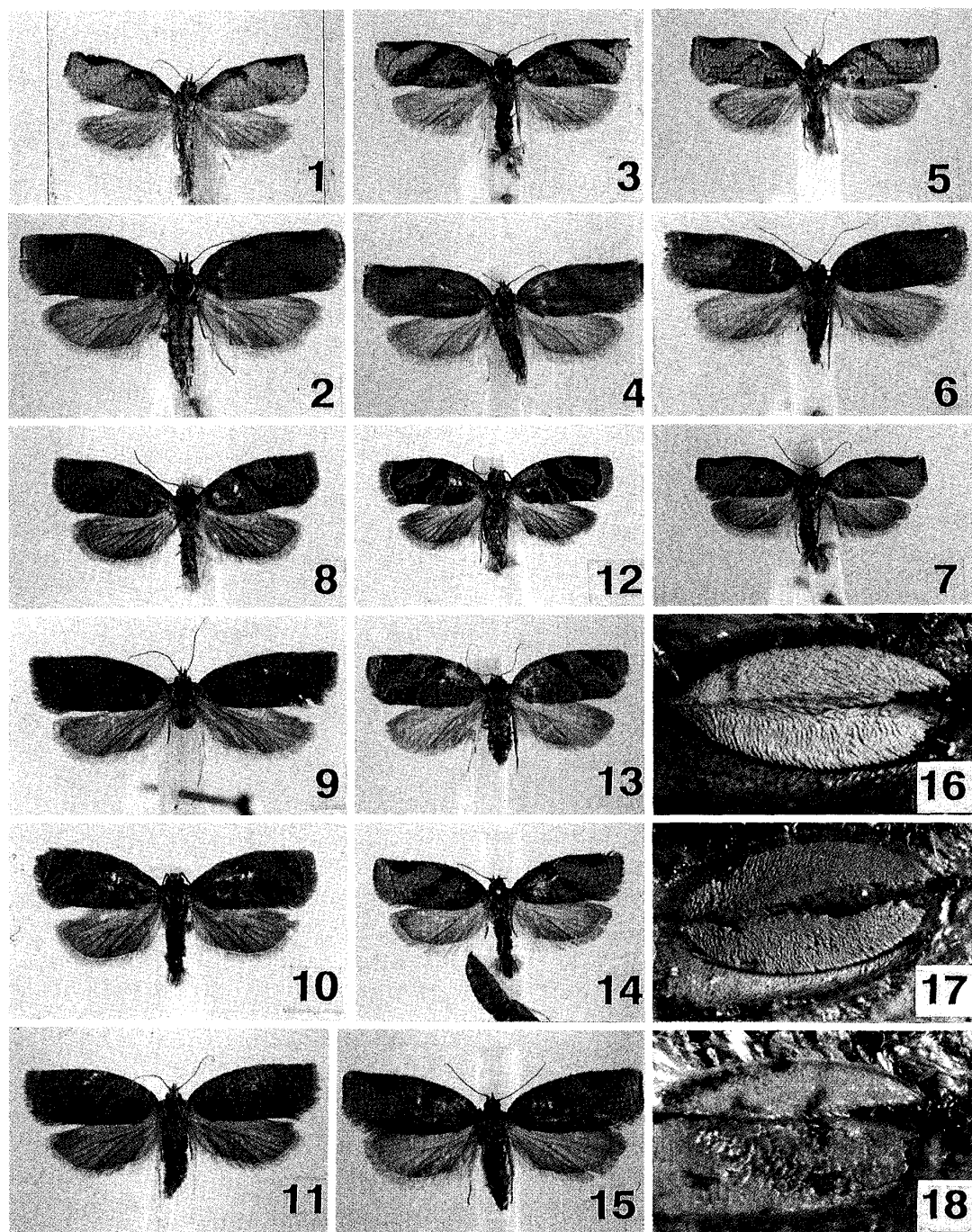
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**Abstract** All Japanese species of *Adoxophyes* were re-examined with emphasis on the male and female genitalia. *A. fasciata* Walsingham is treated as a subspecies of *A. orana* (Fischer von Röslerstamm). A tortricid pest of tea in Japan, previously treated as ‘the tea form of *orana*’ or ‘*Adoxophyes* sp., the smaller tea tortrix’, is taxonomically re-examined and described here as a new species, *A. honmai* sp. nov. *A. dubia* sp. nov. is also described from southern Japan, and is closely related to *A. honmai* sp. nov., with which it has been confused in the past. Adult and genitalia of each sex are figured for three species.

**Key words** *Adoxophyes orana fasciata*, *Adoxophyes honmai* sp. nov., *Adoxophyes dubia* sp. nov., Tortricidae, Japan.

Species of *Adoxophyes* Meyrick are cosmopolitan in distribution, with the greatest diversity in the Indo-Malayan and Austro-Malayan subregions. Taxonomic studies of various *Adoxophyes* species were provided by Clarke, Diakonoff, Freeman, Meyrick and the author. In these studies the wing pattern and the male and female genitalia were briefly described and illustrated. Diakonoff described many Indo-Malayan and Papuan species of *Adoxophyes* between 1941 and 1967. Nevertheless, in the Oriental and Australian regions there are many *Adoxophyes* species that remain undescribed.

The extensive colour and pattern variation of the forewing and morphological resemblance among *Adoxophyes* species have created difficulties in the identification of species. Diakonoff (1961) also noted as follows: “Since the validity of a species, described by me some time ago, appeared dubious to me later and I had an opportunity to re-study the original material, I wish to make some notes and re-definitions on certain species of the *fasciculana* group of *Adoxophyes* which are very closely interrelated, but as I believe, quite distinct.” Yasuda (1956) compared the male genitalia of the Japanese species, and concluded that they should be conspecific, applying the name *A. orana* (Fischer von Röslerstamm) for them. A further study of Japanese species, was constructed by Honma (1972). We recognized two forms, *i. e.*, apple form and tea form, within the species based on characters of adults and immatures. Since 1971, many important papers concerning the female-produced sex pheromones of two forms in Japanese *orana* have been published by Tamaki and others (1971a, 1971b, 1979). (Z)-9- and (Z)-11-tetradecenyl acetate were identified as pheromonal components (optimum ratio of the components was 9:1) of *orana* (apple form; summer-fruit tortrix moth), and (Z)-9- and (Z)-11- and (E)-11-tetradecenyl acetate and 10-methyldodecyl acetate (optimum ratio of the components was 63:31:4:2) for *Adoxophyes* sp. (tea form; smaller tea tortrix moth). This paper, part of a long-term study of the genus *Adoxophyes* by the author, examined the Japanese species as a prelude to intensive analysis of the genus. Examination of extensive material from Japan, hitherto identified as *A. orana* and/or



Figs 1-15. *Adoxophyes* spp. 1-7. *A. dubia* sp. nov., paratypes (1. ♂, Inunakisan, 1. V. 1957. 2. ♀, Inunakisan, 13. V. 1966. 3. ♂, Kii-ooshima, 16. VII. 1979. 4. ♀, Kii-ooshima, 16. VII. 1979. 5. ♂, Okinawa, 24. III. 1980. 6. ♀, Okinawa, 25. III. 1980. 7. ♂, Kii-ooshima, 16. VII. 1976). 8-11. *A. orana fasciata* (8. ♂, Yoshino, 8. VI. 1970. 9. ♀, Nara, 4. V. 1965, ex apple. 10. ♂, Tochigi, 17. IX. 1968. 11. ♀, Morioka, 29. V. 1964, ex apple). 12-15. *A. honmai* sp. nov., paratypes (12. ♂, Shizuoka, 2. VIII. 1996, ex tea. 13. ♀, Shizuoka, 2. VIII. 1996, ex tea. 14. ♂, Sakai, 20. IV. 1988, ex tea. 15. ♀, Sakai, 17. IV. 1988, ex tea).

Figs 16-18. Glandular scales in the costal fold of *Adoxophyes* spp. 16. *A. orana fasciata*. 17. *A. dubia* sp. nov. 18. *A. honmai* sp. nov.

*Adoxophyes* sp. has shown that the Japanese representatives in fact belong to three different taxa, which are well separated externally and less conspicuously in the male and female genitalia.

### Genus *Adoxophyes* Meyrick, 1881

*Adoxophyes* Meyrick, 1881, *Proc. Linn. Soc. N. S. W.* **6**: 429. Type species: *Adoxophyes heteroidana* Meyrick, 1881 (E. Australia) by monotypy.

Head with rough scales. Antennae reaching beyond half of costa. Palpi moderate, porrected, second segment smooth at base above, strongly dilated towards apex by rough scales above and beneath, especially above. Thorax smooth, without a crest. Abdomen long, with a large anal tuft in male.

Forewings broad, elongate-truncate, with a costal fold in the male reaching about 1/2 of costa, elongate; costa strongly arched anteriorly, slightly sinuate before apex, apex rounded, projecting in female, termen sinuate above, rounded and projecting beneath, dorsum straight. Vein  $M_3$  from angle of median cell parallel to  $M_2$ ,  $M_1$  approximated to the stalk of  $R_5$  and  $R_4$ ; this stalk long. Hindwings semioval.

Male genitalia. Tegumen broad and strong. Saccus moderate, rounded. Valva elongate with a brachiola. Uncus large, elongate, dilated and indent at the top. Gnathos long, W-shaped, terminating in a blunt point. Socii small, elongate. Transtilla paired, dentate above. Aedeagus pistol-shaped, strong, cornuti a sheaf of spines.

Female genitalia. Ovipositor lobes short, broad, dilated at apex. Ostium small, rounded. Antrum lightly sclerotized. Inception of ductus seminalis lateral at anterior edge of antrum. Ductus bursae membranous except for a granular area anterior to antrum. Bursa copulatrix and bulla seminalis membranous, rather large. Signum sickle-shaped from a strongly sclerotized base at junction of ductus bursae and bursa copulatrix.

On the basis of genitalic morphology, the genus *Adoxophyes* may be divided into two or three groups. Japanese species belong to the *orana-privatana* group. Differentiation of the species of this group is not always easy. There is considerable variability of the size and the breadth of the forewing, and of the coloring on the markings.

One of the difficult points is the assignation of the opposite sexes which often show considerable dimorphism. Although the typical males of each species may be quite different, the females are difficult to separate. Only field observations and extensive collecting and rearing will provide definitive means of delimiting the species.

### *Adoxophyes orana* (Fischer von Röslerstamm)

#### *Adoxophyes orana orana* (Fischer von Röslerstamm)

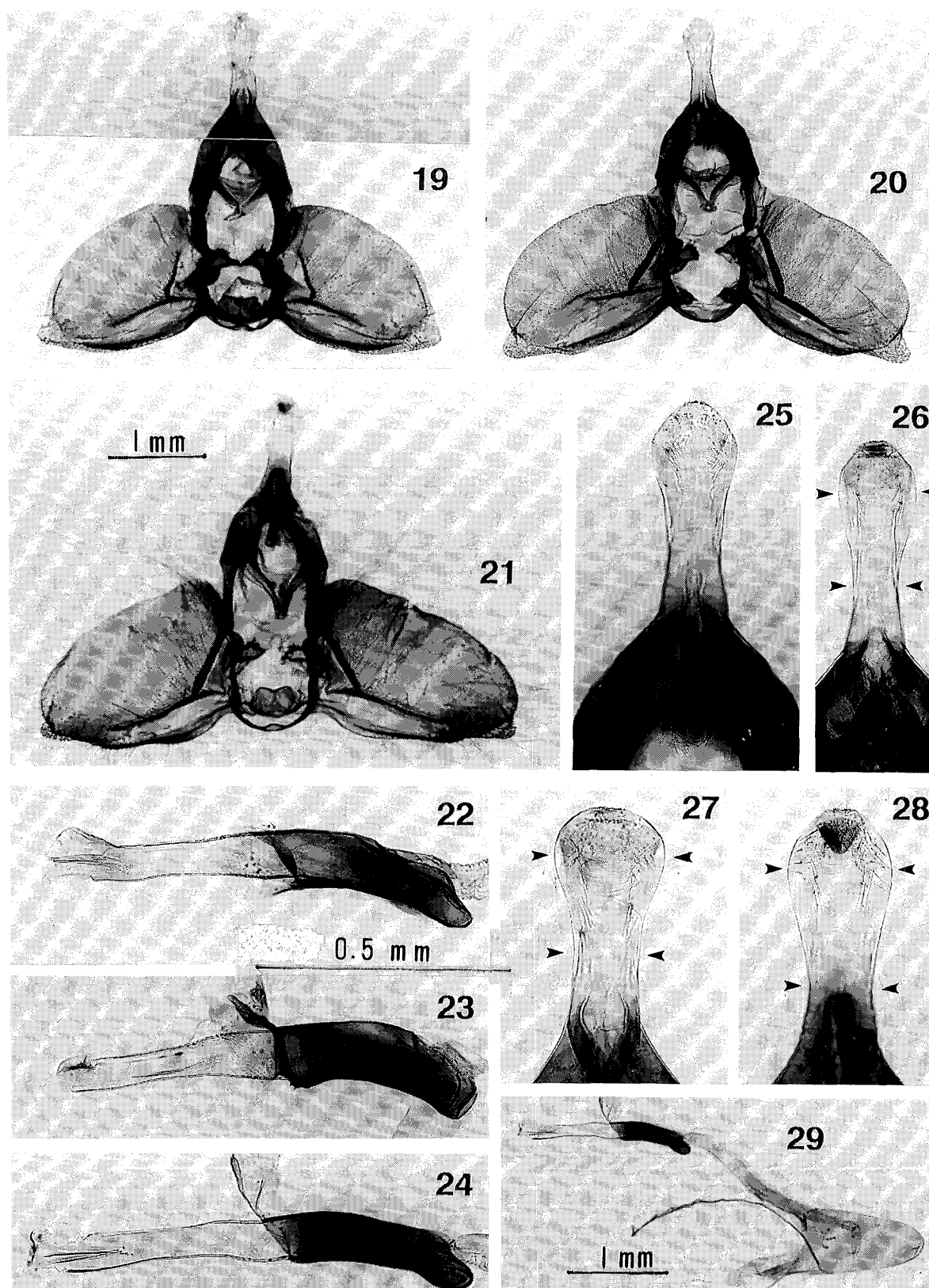
*Tortrix reticulana* Hübner, 1818, *Samml. eur. Schmett.* **7**: pl. 43, fig. 271, *nec* Haworth, 1811.

*Tortrix orana* Fischer von Röslerstamm, 1834, *Abbild. Bericht. Ergänzt. Schmettkde.*: 13, pl. 9, fig. 3.

*Adoxophyes orana*: Bradley, 1952: 1, pl. 1; Denotter *et al.*, 1978: 370.

*Adoxophyes reticulana*: Chambon & d'Aguilar, 1974: 424, *nec* Haworth, 1811.

FL. ♂ 10.0–11.0 mm, ♀ 11.0–13.0 mm. The forewing of the female is rather dull greyish brown, while in the male the coloration is brighter and is a yellowish brown. The male has a fold that extends about 1/2 of the length of the costa, and the fold is lined with whitish



Figs 19-29. Male genitalia of *Adoxophyes* spp. 19, 22, 27. *A. orana fasciata*. 20, 23, 25, 26. *A. honmai* sp. nov. (20, 25. Holotype. 23, 26. Paratype.). 21, 24, 28, 29. *A. dubia* sp. nov., holotype. Arrows indicate head and neck of uncus.

small glandular scales.

The subspecies has so far been generally known from continental Europe.

***Adoxophyes orana fasciata* Walsingham (Figs 8-11, 16, 19, 22, 27, 30, 33, 36, 37, 44, 46)**

*Adoxophyes fasciata* Walsingham, 1900, *Ann. Mag. nat. Hist.* (7) 5: 482; Issiki, 1922: 283.

*Adoxophyes orana fasciata*: Yasuda, 1975: 129; Kawabe, 1982, 1: 72, 2: 161, pl. 16, figs 37-38; Shirasaki & Yamada, 1983: 33; Sugie *et al.*, 1984: 156.

*Adoxophyes orana*: Yasuda, 1956: 23, 24, *partim*; Honma, 1965: 35 (as smaller tea tortrix); Honma, 1970a: 47 (as smaller tortrix); Honma, 1970b, *partim*; Tamaki *et al.*, 1971b: 338-340 (as summer fruit tortrix); Honma, 1972: 1-33, *partim* (as apple form); Yukinari, 1976a: 1; Yukinari, 1976d: 15.

FL. ♂ 7.0-9.0 mm, ♀ 9.0-11.5 mm. Both sexes of *fasciata* are illustrated in Figs 8-11. The sexes differ a little in coloration and the markings in the forewing. The forewing of the female is rather dull cinnamon brown, while in the male the coloration is brighter and is yellowish brown. The markings in the female forewing are reduced, as can be seen from the illustrations.

Male genitalia. Valva ample with a broad brachiola. Uncus spatulate with short and rounded top. Gnathos arms broad, apex upturned and rounded. Transtilla lobes moderately broad, beaked, touching each other, with strong thorns of variable size. Juxta heart-shaped, rather broad. Vinculum rounded. Aedeagus cylindrical, slightly curved, with a well-defined coecum penis. Vesica with a cluster of 7-9 slender, spiculate cornuti.

Female genitalia. Ovipositor lobe large. Ostium opening small, rounded. Antrum lightly sclerotized. Inception of ductus seminalis lateral at anterior edge of antrum. Bulla seminalis slightly smaller than bursa copulatrix. Ductus bursae membranous except for a granular area anterior to antrum. Bursa copulatrix spherical, signum hook-shaped from a strongly sclerotized base at junction of ductus bursae and bursa copulatrix.

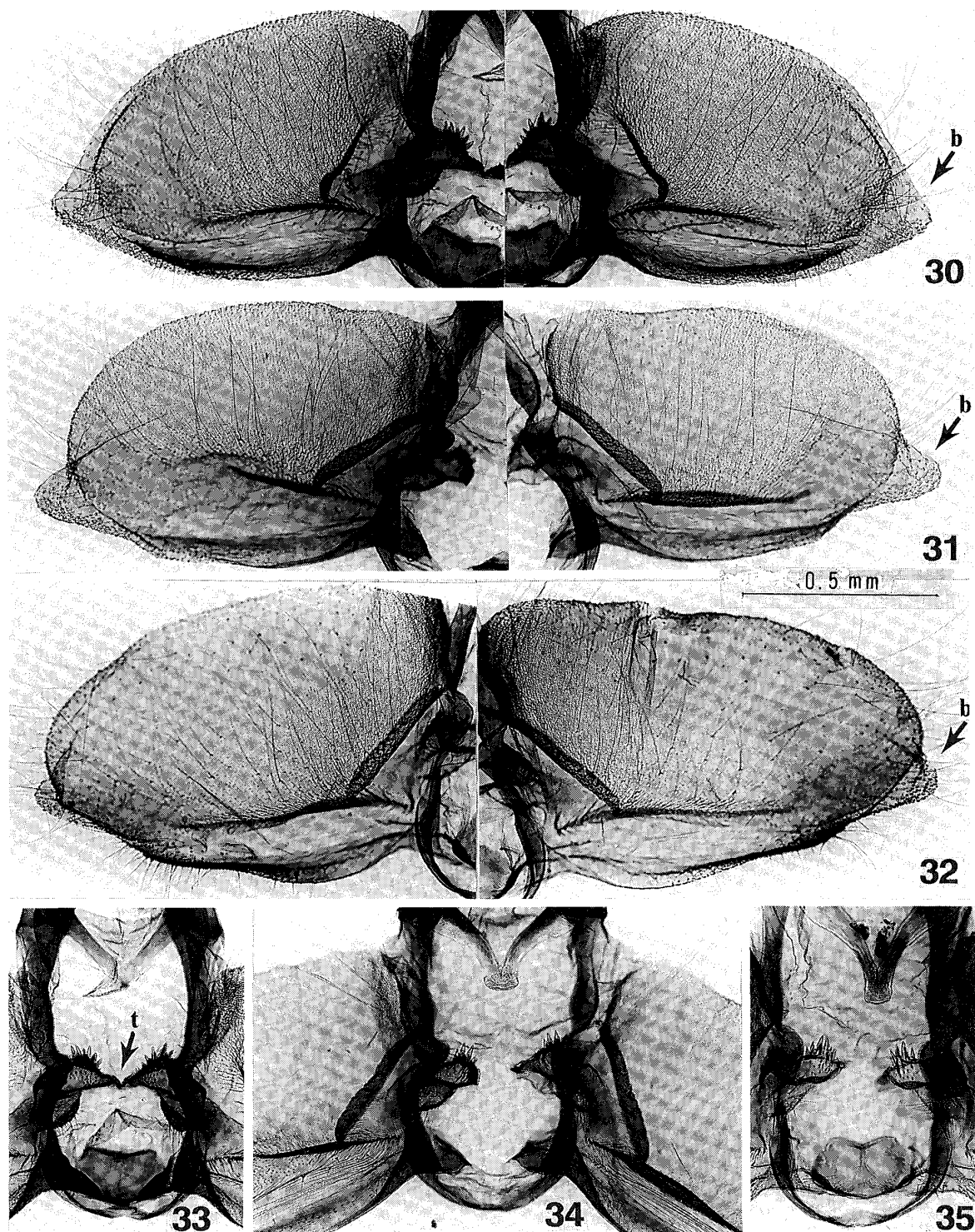
Type material examined. Lectotype ♀, "Japan, Pryer 1886, 70052", Walsingham collection, genitalia slide BM No. 2476; paralectotype 1 ♂, "JAPAN, Pryer 1886, 70054", Walsingham collection, genitalia slide BM No. 2496 (BM).

Other specimens examined. HOKKAIDO: 1 ♂, Sapporo, 25. VIII. 1917, S. Issiki; 1 ♂, Nopporo, 20. VI. 1978, F. Komai; 2 ♀, Bibai, 21-23. VI. 1978, F. Komai. HONSHU: 1 ♂, Aomori, Kuroishi, 25. V. 1964, *ex* apple, M. Takahama; 2 ♂ 2 ♀, same loc., 27. V. 1964, *ex* apple, M.T.; 1 ♂ 1 ♀, Aomori, Hirosaki, 13. V. 1955, *ex* apple, T. Yasuda; 1 ♂ 1 ♀, Iwate, Morioka, 29. V. 1964, *ex* apple, M. Takahama; 2 ♂ 2 ♀, same loc., 19. V. 1955, *ex* apple, T. Yasuda; 2 ♂ 1 ♀, Fukushima, Yanagawa, 28. V. 1980, T. Yoshii; 1 ♂ 2 ♀, Nagano, Suzaka, 27. V. 1964, *ex* apple, M. Takahama; 1 ♂, same loc., 21. V. 1964, *ex* apple, M.T.; 1 ♀, same loc., 20. V. 1964, *ex* apple, M.T.; 2 ♂, Fukui, Imajyo, Iwaya, 7. VI. 1964, M.T.; 2 ♀, Nara, Shiroganemura, 4. V. 1955, *ex* apple, T. Yasuda; 7 ♂ 3 ♀, Nara, Yoshino, 8. VI. 1970, T. Yasuda.

Distribution. Hokkaido and Honshu.

The larvae are polyphagous and important pests on various fruit crops, especially on apple, and are voracious feeders, causing considerable harm to foliage, blossoms and fruits.





Figs 30-35. Male genitalia of *Adoxophyes* spp. 30, 33. *A. orana fasciata*. 31, 34. *A. honmai* sp. nov., holotype. 32, 35. *A. dubia* sp. nov., holotype. Arrows b indicate brachiola, and arrow t indicates joining point of transtilla lobes.

***Adoxophyes honmai* sp. nov.** (Figs 12-15, 18, 20, 23, 25, 26, 31, 34, 38, 39, 42, 45)

*Adoxophyes privatana*: Issiki, 1922, *Zool. Mag. Tokyo*. **34**: 283, *partim*; Nawa, 1935: 1-33, 5 pls, *partim*; Minamikawa, 1950: 36; Minamikawa, 1953: 18; Minamikawa *et al.*, 1955: 34; Osa-

kabe, 1956 : 31, *nec* Walker, 1863 (as tea smaller tortrix).

*Adoxophyes orana* : Yasuda, 1956 : 23, 24, *partim* ; Honma, 1966 : 32-36 ; Tamaki *et al.*, 1969 : 97, 102, 107 (as smaller tea tortrix) ; Honma, 1970b : 89-94, *partim* ; Honma, 1972 : 1-33, *partim nec* Fischer von Röslerstamm, 1834 (as tea form).

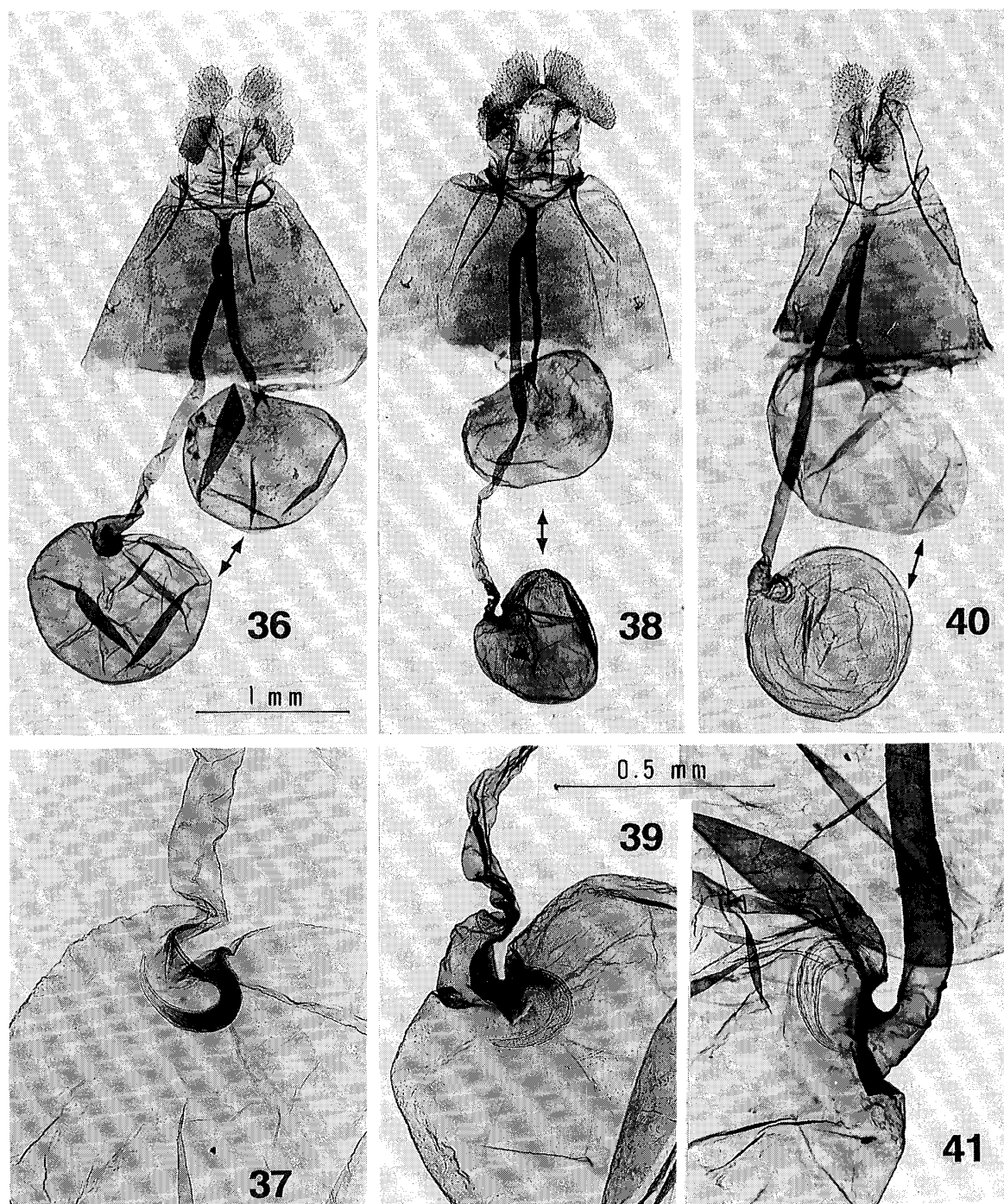
*Adoxophyes fasciata* : Tamaki, 1971a : 139 (as smaller tea tortrix) ; Yasuda, 1972 : 80, 92 ; Yasuda, 1975 : 130 ; Yukinari, 1976 : 1 (as smaller tea tortrix) ; Yukinari, 1976 : 15 (as smaller tea tortrix), *nec* Walsingham, 1900.

*Adoxophyes* sp. : Tamaki *et al.*, 1979 : 101 (as smaller tea tortrix moth) ; Noguchi *et al.*, 1979 : 225 (as tea tortrix moth) ; Tamaki *et al.*, 1980 : 221 ; Shimizu and Tamaki, 1980 : 140 (as smaller tea tortrix moth) ; Noguchi, 1981 : 259 (as smaller tea tortrix moth) ; Kawabe, 1982, **1** : 72, **2** : 161, pl. 16, figs 39-44 ; Tamaki *et al.*, 1983 : 154 (as tea tortricid moth) ; Tamaki and Sugie, 1983 : 292 (as tea tortricid moth) ; Tamaki *et al.*, 1984 : 161 ; Tamaki *et al.*, 1984 : 245 ; Noguchi, 1984 : 118 ; Noguchi and Tamaki, 1985 : 113 ; Noguchi *et al.*, 1985 : 278.

Male. FL 7.3 mm. Head, palpus and thorax brownish-ochreous. Abdomen glossy greyish ochreous, and tuft large, pale fuscous. Forewing elongate-truncate, with a broad, richly ciliate costal fold, just not reaching middle of costa ; costa broadly curved along anterior 2/3, posterior third appearing slightly concave ; termen vertical above, rounded below. Ochreous-yellowish, glossy, faintly suffused with pale brown except faint light edges to markings. Markings greyish-brown, narrowly edged with pale ground colour. Basal patch represented by a semicircular spot, occupying almost anterior 1/3 of dorsum ; transverse central fascia from before middle of costa, from before end of costal fold which is suffused with dark grey there, to 2/3 of dorsum, sharply edged with pale ochreous, moderately broad along upper half, below middle of disc triangularly dilated posteriorly, reaching from 2/3 of dorsum to tornus, where its posterior edge is suffused ; posterior edge of fascia above its end with a posterior branch running first horizontally, and bent at an angle, then narrowed and terminating at the tornus ; concavity on dorsal edge filled with lilac ; costal patch large, erect-triangular, occupying costa from 2/3 almost to apex, its anterior edge very oblique. Cilia glossy ochreous-yellowish, slightly suffused with greyish brown. Hindwing light ochreous-yellowish, somewhat darker posteriorly. Cilia glossy light ochreous-yellowish, paler than wing.

Female. FL 8.0 mm. Head, palpus and thorax tawny-ochreous. Abdomen glossy greyish ochreous. Forewing with costa curved anteriorly, rather straight posteriorly, apex obtuse, termen vertical above, little rounded below. Deep tawny-ochreous ; costa with a series of small suffused greyish-brown specks ; basal patch indicated by a conspicuous small erect triangular greyish-brown patch on 1/3 of dorsum, with top continued into a more or less distinct irregular streak to costa ; central fascia from 2/5 of costa to 2/3 of dorsum, moderately broad along upper half, below middle of disc triangularly dilated posteriorly, reaching from 2/3 of dorsum to tornus, lilac-filled cavity larger ; costal patch wedge-shaped, occupying costa from before 2/3 to well before apex ; on costa this patch marked with two dark elongate dots on margins ; anterior edge of patch abruptly sinuate and oblique below costa, concave in middle ; posterior edge of patch straight ; an elongate, ill-defined lilac-grey suffusion below costa filling extended part of costal patch except its edges ; a minute, dark brown marginal line along termen, interrupted in veins. Cilia brighter than in male. Hindwing somewhat more yellow ; dorsum as far as vein 1c suffused with pale grey. Cilia light ochreous, glossy.

Male genitalia (Fig. 20 ; genit. slide 93-971) of the *A. orana* type, with slightly large and elongate valva. The difference from *A. orana* may be summarized as follows : in *honmai* sp. nov., uncus slightly truncate on top (Figs 25, 26), apical membranous projection small and



Figs 36-41. Female genitalia of *Adoxophyes* spp. 36, 37. *A. orana fasciata*. 38, 39. *A. honmai* sp. nov., paratype. 40, 41. *A. dubia* sp. nov., paratype. Arrows indicate bursa copulatrix and bulla seminalis.

shrunk (Fig. 42), and neck of uncus narrower than in *orana* (Figs 25, 26); brachiola finger-shaped (Fig. 31, arrow b); transtilla lobes not touching at proximal ends (Fig. 34).

Female genitalia very similar to those of *orana* but with the bursa copulatrix much smaller, ductus bursae distinctly longer (genit. slide 93-973, paratype).

Type series. Holotype. ♂, Japan, Honshu, Osaka, Sakai, 12. X. 1964, *ex tea*, M. Taka-



hama, genit. slide 93-971. Paratypes. HONSHU: 1 ♂, Osaka, Sakai, 2-6. X. 1964, *ex tea*, M. Takahama, genit. slide 93-970; 1 ♀, same loc., 24. IX. 1964, *ex tea*, M.T., gen. slide 93-972; 1 ♀, same loc., 8. X. 1964, *ex tea*, M. T., gen. slide 93-973; 3 ♂ 1 ♀, same loc., 22-27. VIII. 1964, *ex tea*, M. T.; 1 ♂, same loc., 25. IX. 1964, *ex tea*, M.T.; 3 ♂, same loc., 27. IX. 1964, *ex tea*, M.T.; 1 ♂, same loc., 12. X. 1964, *ex tea*, M.T.; 4 ♂, same loc., 18-20. X. 1964, *ex tea*, M.T.; 1 ♀, same loc., 28. IX. 1964, *ex tea*, M.T.; 2 ♀, same loc., 21. X. 1964, *ex tea*, M.T.; 2 ♀, same loc., 2. XI. 1964, *ex tea*, M.T.; 1 ♀, Osaka, Sakai, Mikunigaoka, 18. IX. 1963, *ex Quercus phillyraeoides*, M.T.; 1 ♀, same loc., 30. IX. 1963, *ex Q. phillyraeoides*, M.T.; 1 ♂, Osaka, Sakai, Ootori, 11. VI. 1964, *ex Solidago altissima*, M.T.; 1 ♂, same loc., 12. VI. 1964, *ex S. altissima*, M.T.; 1 ♂, Osaka, Izumi, Kankitsu Exp. Stat., 15. IX. 1963, *ex tea*, M.T.; 1 ♂, Osaka, Kishiwada, Haruki, 30. IX. 1963, *ex tea*, M.T.; 1 ♂ 1 ♀, Osaka, Sakai, OPU, larvae 9. IV. 1987, *ex tea*, em. 20, 28. IV. 1987, T. Yasuda; 2 ♂, Osaka, Sakai, Tazono, larvae 9. IV. 1988, *ex tea*, em. 20. IV. 1988, T.Y.; 2 ♀, same loc., larvae 9. IV. 1988, *ex tea*, em. 17. IV. 1988, T. Y.; 1 ♀, Izumi, Sakai, Mozu, 16. IV. 1955, *ex tea*, T.Y.; 1 ♂ 1 ♀, Izumi, Sakai, larvae 5. VI. 1955, *ex Michelia champace*, em. 15. VI. 1955, T.Y.; 1 ♂, Osaka, Sayama, 14. VI. 1955, *ex tea*, T.Y.; 1 ♂, same loc., 17. VI. 1955, *ex tea*, T.Y.; 2 ♀, Osaka, Tondabayashi, Yamatecho, 1. X. 1978, S. Moriuti; 1 ♂ 1 ♀, same loc., 4. X. 1978, S.M. (genit. slides 91-03, 91-04); 2 ♂ 1 ♀, same loc., 10. X. 1978, S. M.; 2 ♂, Kinki, Nishinomiya, 28. VII. 1949, *ex cherry*, S. Issiki; 1 ♂, Nara, Takata, 17. IX. 1964, *ex tea*, S. Sumitomo; 1 ♂, same loc., 2. X. 1964, *ex tea*, S. Sumitomo; 1 ♀, same loc., 20. IX. 1964, *ex tea*, S. Sumitomo; 6 ♂ 5 ♀, Shizuoka, Shimada, Hatsukura, 2-7. VIII. 1996, *ex tea*, A. Tatara. Types are preserved in the collection of the Entomological Laboratory, Osaka Prefecture University.

Distribution. Honshu, also possibly from Shikoku and Kyushu.

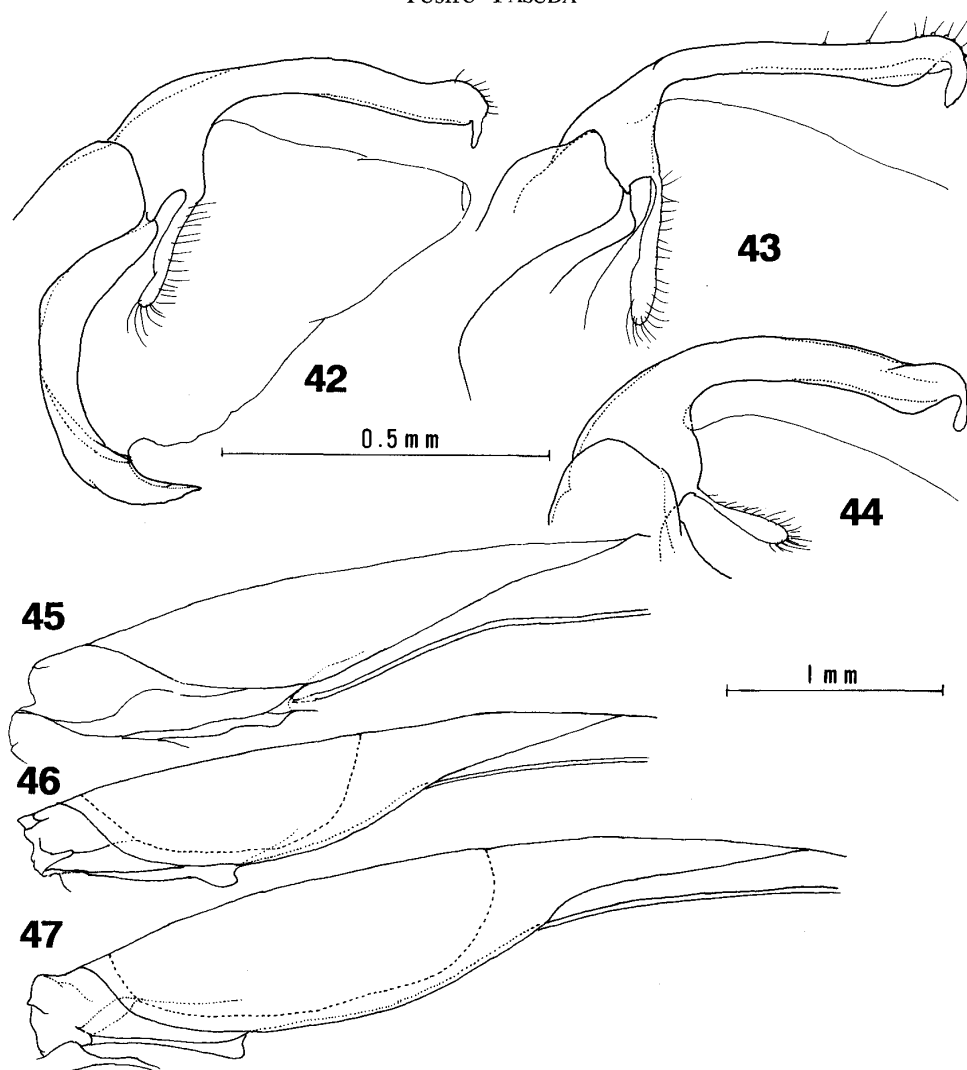
This species is widely distributed in southern Honshu, where it is an important pest attacking tea. Although normally associated with tea, larvae of this species sometimes occur on many trees and shrubs.

***Adoxophyes dubia* sp. nov.** (Figs 1-7, 17, 21, 24, 28, 29, 32, 35, 40, 41, 43, 47)

*Adoxophyes privatana*: Issiki, 1922: 283, *partim*; Nawa, 1935: 1-33, 5 pls, *partim nec* Walker, 1863.

*Adoxophyes orana*: Yasuda, 1956: 23, 24, *partim*; Honma, 1972: 1-33, *partim nec* Fischer von Röslerstamm, 1834 (as tea form).

Male. FL 8.0 mm. Head, palpus and thorax pale ochreous-fuscous. Abdomen glossy pale greyish-ochreous, anal tuft light ochreous, large. Forewing with a costal fold to beyond middle of costa, edged below with long roughish fringe of scales (the fold is lined with small brownish glandular scales), costa little curved, oblique along 1/3, subprominent at 1/3, gradually sinuate posteriorly; apex obtuse-rectangular; termen gently concave, vertical above, broadly rounded beneath. Very pale ochreous, glossy; markings bright brown, narrowly edged with pale ground-colour. An oblique, small truncate-pyramidal blotch on 1/3 of dorsum, with top continued into a more or less indistinct irregular streak to below costal fold; central fascia from before middle of costa to 3/4 of dorsum, with a small, brown patch on apex of costal fold, moderately broad along upper half, below middle of disc triangularly dilated posteriorly, reaching from 3/4 of dorsum to before tornus, where its posterior edge is suffused; costal patch triangular, occupying costa from 2/3 almost to apex; top of mark subacute, connected with 3/4 of termen by a minute slightly curved brown line. Cilia pale ochreous, from apex to above tornus with posterior half ferruginous. Hindwing



Figs 42-44. Lateral view of uncus of *Adoxophyes* spp. 42. *A. honmai* sp. nov. 43. *A. dubia* sp. nov. 44. *A. orana fasciata*.

Figs 45-47. Dorsal view of costal folds on forewing of *Adoxophyes* spp. (denuded of scales). 45. *A. honmai* sp. nov. 46. *A. orana fasciata*. 47. *A. dubia* sp. nov.

pale greyish-ochreous, becoming yellowish towards apex. Cilia glossy greyish-ochreous, paler than wing.

Female. FL 9.0 mm. Head, palpus and thorax deeper ochreous-yellow. Abdomen light greyish-ochreous. Forewing rather broad, truncate, costa strongly arched anteriorly, straight posteriorly, apex obtusely rectangular, termen concave, vertical. Light ochreous-yellow, with numerous deeper ochreous-yellow small transverse strigulae. Markings fuscous; central fascia from  $2/5$  of costa to  $2/3$  of dorsum, dilated below  $1/3$  of disc, costal patch triangular, with elongate base extending from  $3/5$  of costa almost to apex. Cilia glossy yellowish-ochreous, paler than wing, from apex to above tornus with posterior half ferruginous. Hindwing glossy greyish-ochreous, becoming yellowish towards apex. Cilia pale ochreous.

The male and female genitalia of this species are very similar to those of the preceding species *honmai* sp. nov. in structure, differing as follows:

- (1) The uncus is moderately broad and robust, with a well-defined membranous apical lobe

Table 1. Comparisons of morphological characters in the Japanese species of the genus *Adoxophyes*.

	<i>orana fasciata</i>	<i>honmai</i> sp. nov.	<i>dubia</i> sp. nov.
Forewing			
ground colour ♂	yellowish brown to light greyish brown (Figs 8, 10)	glossy ochreous brown (Figs 12, 14)	pale whitish ochreous, glossy (Figs 1, 3, 5, 7)
♀	pale reddish brown (Figs 9, 11)	deep tawny-ochreous (Figs 13, 15)	yellowish brown to deep tawny ochreous (Figs 2, 4, 6)
costal fold	lined with whitish small glandular scales (Fig. 16) dorsal edge reaching vein Sc (Fig. 46)	without glandular scales (Fig. 18) dorsal edge not reaching vein Sc (Fig. 45)	lined with brownish small glandular scales (Fig. 17) dorsal edge reaching vein Sc (Fig. 47)
♂ genitalia			
uncus	spatulate, rather broad, top dilated, rounded (Fig. 27)	spatulate, narrow, slightly truncate on top (Figs 25, 26)	spatulate, broad, somewhat narrowed towards apex; apex truncate (Fig. 28)
apical membranous projection of uncus	moderate size (Fig. 44)	small (Fig. 42)	large (Fig. 43)
brachiola (valva)	triangular (Fig. 30)	tongue-shaped (Fig. 31)	tongue-shaped (Fig. 32)
transtilla lobes	touching each other (Fig. 33, arrow t)	not (Fig. 34)	not (Fig. 35)
♀ genitalia			
colliculum	long and broad	short and narrow	short and broad
bursa copulatrix (b. c.) and bulla seminalis (b. s.)	b. c. slightly larger than b. s. (Fig. 36)	b. c. slightly smaller than b. s. (Fig. 38)	b. c. smaller than b. s. (Fig. 40)

which is very small in *honmai* sp. nov.

- (2) The valva is similar in shape, but broader and more elongate; the brachiola is smaller than in *honmai* sp. nov.
- (3) The bulla seminalis is oval, larger than in *honmai* sp. nov.

Type series. Holotype. ♂, Japan, Honshu, Osaka, Inunakisan, 30. IX. 1989, T. Yasuda, genit. slide 93-978. Paratypes. HONSHU: 1 ♀, Osaka, Inunakisan, 16. VII. 1988, T. Yasuda, genit. slide 93-980; 1 ♂ 1 ♀, same loc., 3. VII. 1989, T. Yasuda; 1 ♂, same loc., 17. V. 1988, T.Y.; 2 ♀, same loc., 14. IV. 1988, T.Y.; 8 ♂, same loc., 3. VII. 1989, T.Y.; 1 ♂, same loc., 29. V. 1979, Y. Nasu; 9 ♂, same loc., 30. IX. 1989, T.Y.; 3 ♂, same loc., 1. X. 1989, T.Y.; 1 ♂, same loc., 20. XI. 1987, T.Y.; 1 ♂, same loc., 8. V. 1980, T. Tanabe; 1 ♂, same loc., em. 1. V. 1957 ex *Lyonia ovalifolia neziki*, S. Moriuti; 1 ♀, same loc., em. 3. V. 1966 ex *Ribes fasciculata*, T. Saito; 1 ♂, Osaka, Minoo, 12. IV. 1979, Y. Nasu; 1 ♂,

same loc., 10. IV. 197?, F. Komai ; 1 ♂, Wakayama, Kii-ooshima, 30. VII. 1955, S. Issiki ; 1 ♂ 1 ♀, same loc., 31. VII. 1955, S.I. ; 12 ♂ 5 ♀, same loc., 16. VII. 1979, T. Yasuda, genit. slide 93-981. SHIKOKU : 1 ♂, Tokushima, Nishiiyayama, Iyakei, 13. IX. 1989, Y.S. Bae ; 1 ♂, Koochi, Iwaidani, 15. VI. 1964, S. Moriuti. KYUSHU : 1 ♂, Nagasaki, Tsushima, Mt Ooboshi, 17. X. 1979, K. Yasuda ; 1 ♂, Kumamoto, Amakusa, Kawaura, 15-16. V. 1994, Y.S. Bae ; 1 ♂ 1 ♀, Kagoshima, Satamisaki, 19. V. 1979, Y. Arita ; 2 ♂, same loc., 20. V. 1979, Y.A. ; 1 ♂ 1 ♀, same loc., 21. V. 1979, Y.A. ; 1 ♂ 2 ♀, Yakushima, Onoaida, 19. VIII. 1980, K. Yasuda ; 1 ♂, same loc., 20. VIII. 1980, K. Yasuda ; 1 ♂ 1 ♀, same loc., 19. IX. 1978, S. Moriuti ; 3 ♂ 3 ♀, Yakushima, Kurio, 20. VIII. 1980, K. Yasuda ; 1 ♂ 2 ♀, Yakushima, Koseda, 17. VII. 1978, K. Yasuda ; 1 ♂, Yakushima, Nakama, 20. IX. 1978, S. Moriuti ; 5 ♂ 2 ♀, same loc., 21. IX. 1978, S. Moriuti, genit. slides 93-982, 93-983 ; 3 ♂, Okinawa, Chinen, 24. III. 1980, K. Yasuda, genit. slides 93-984, 93-989 ; 1 ♂ 1 ♀, Okinawa, Mt Katsuudake, 25. III. 1980, K. Yasuda ; 2 ♂ 1 ♀, Ishigaki, Takeda, 13. III. 1978, Y. Arita, genit. slide 93-986. Types are preserved in the collection of the Entomological Laboratory, Osaka Prefecture University.

**Distribution.** Southern Honshu, Shikoku, Kyushu and Okinawa (the Ryukyu Isls).

This moth has only been recorded on *Lyonia* and *Ribes* once and never from tea in southern Honshu.

All three species treated in this paper are sexually dimorphic, produce considerable phenotypic variation and distinct seasonal forms. *A. orana fasciata*, *A. honmai* sp. nov. and *A. dubia* sp. nov. share overall trends in wing color and pattern which changes between summer and spring or autumn forms. The similarity of wing coloration and pattern trends among the seasonal forms of *A. orana fasciata*, *A. honmai* sp. nov. and *A. dubia* sp. nov. is clearly apparent (Figs 1-15).

The taxonomy of the genus *Adoxophyes* is confused, and the discrimination of its species is difficult. This is chiefly due to the dubious identity of certain species, and also to the similarity of both the external and internal structures of the numerous species. The subsequent taxonomic studies demonstrated the presence of many closely related species forming the *orana-privatana* group. Further study will be required to determine the species of the group.

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## 摘 要

日本産 *Adoxophyes* 属 (鱗翅目, ハマキガ科) (保田淑郎)

筆者は、日本産の本属の種についての検討を 1956 年に行い、当時の知識と雌雄交尾器の形態から、日本のものは *Adoxophyes orana* (Fischer von Röslerstamm) であるとした。その後、農業上、園芸上の害虫として本属に属する種が重要視され、特にリンゴとチャをそれぞれ加害するもの (リンゴコカクモンハマキ、チャノコカクモンハマキあるいはコカクモンハマキのリンゴ型、チャ型) について多くの研究者による生態学的、生理学的、形態学的な研究が進められてきた。このような経緯の中で筆者は再び 1975 年、リンゴを主に加害するリンゴコカクモンハマキに *A. orana fasciata* Walsingham の名をあて、チャノコカクモンハマキに対しては種名を決定できぬまま *Adoxophyes* sp. として対応した。

ハマキガ亜科の昆虫は明瞭な性的二型を有するが、*Adoxophyes* 属のものも例外ではない。特に、今回新種として記載した 2 種は顕著な性的二型を示す。また、幼虫期における温度の差、すなわち低温、高温によって成虫の翅の基色や斑紋に変化が生じる。一般的に幼虫期に高温を経験すると成虫の斑紋は明瞭、濃色となる傾向があり、外見では同定が容易ではない。

しかし、雄の前翅の costal fold やその内面の特化した鱗片群、雌雄交尾器などの詳細な形態を比較検討した結果、チャノコカクモンハマキとリンゴコカクモンハマキは形態的に識別可能であり、さらにチャノコカクモンハマキとされていたものには 2 種が混同されていたことが明らかになった。今回、現在の混乱を避ける意味で日本に分布するものについて一応の整理をおこなったが、今後もさらに総合的な研究が続けられる必要がある。

本論文では日本産 *Adoxophyes* 属を次のように整理した。

### 1. *Adoxophyes orana fasciata* Walsingham リンゴコカクモンハマキ

翅は赤色味を帯び、斑紋は乱れている。Costal fold の内部両面には白色で紡錘形の特化した鱗片群を密に有する。バラ科植物を主に寄主とし、北海道と本州とに分布する。

### 2. *Adoxophyes honmai* sp. nov. (新種) チャノコカクモンハマキ

翅は黄土色で光沢があり、斑紋は明瞭である。Costal fold は 3 種の中ではもっとも狭く、内面には特化した鱗片群はない。主にチャを寄主とし本州西南部に分布する。おそらく四国、九州にも分布すると思われる。

### 3. *Adoxophyes dubia* sp. nov. (新種) ウスコカクモンハマキ (新称)

本種はチャノコカクモンハマキと混同されていた。翅は白っぽく光沢があり、斑紋は明瞭である。Costal fold は 3 種の中ではもっとも大きく長く、その内面は褐色で紡錘形の特化した鱗片群で裏打ちされている。本州西南部、四国、九州、琉球列島に分布する。本種は本州のネジキとヤブサンザシで飼育、羽化した記録はあるが、本州でチャからは得ていない。

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